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# Effects of Peer Recovery Coaches on Substance Abuse Treatment Engagement Among Child Welfare-Involved Parents

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## Introduction

The past decade has witnessed substantial increases in methamphetamine abuse in the United States. The number of individuals reporting use of methamphetamine during their previous 30 days increased from 314,000 in 2008 to 440,000 in 2012, while the number of individuals reporting use of methamphetamine for the first time in the previous year increased from 97,000 in 2008 to 133,000 in 2012 (SAMHSA, 2013). More than one-half of the referrals for publicly funded methamphetamine abuse treatment come from the criminal justice system (SAMHSA, 2009a). The annual cost of methamphetamine use in the United States is estimated to be \$23.4 billion, including costs associated with criminal justice and social welfare services, health care, loss of productivity, premature mortality, and child imperilment (Nicosia, Pacula, Kilmer, Lundber, & Chiesa, 2009). The effects of methamphetamine use are thus widespread and socially significant.

Pre- and post-natal exposure to illicit substances presents numerous negative consequences for newborns, including physical and emotional difficulties (Twomey et al., 2013; Young et al., 2009; Zabaneh et al., 2012). Prenatal methamphetamine exposure in particular has been associated with fetal growth deficits (including being born small for gestational age [Nguyen et al., 2010; Smith et al., 2003]), birth complications (including preterm delivery and cesarean delivery), neonatal mortality (Good, Solt, Acuna, Rotmensch, & Kim, 2010), increased physiological stress (Smith et al., 2008), and decreased arousal (LaGasse et al., 2011; Smith et al., 2008).

Limited research has been reported on the long-term effects of prenatal methamphetamine exposure. Diaz et al. (2014) examined cognitive and behavioral outcomes of 151 methamphetamine-exposed children and 147 unexposed comparison children who were enrolled in the Infant Development, Environment, and Lifestyle study. At the 7.5-year visit, the methamphetamine-exposed children had significantly higher cognitive problems scores than the unexposed children, but no association was found between prenatal methamphetamine exposure and behavioral problems. Researchers in Sweden followed a cohort of 65 amphetamine-exposed children up through age fourteen (Billing, Eriksson, Jonsson, Steneroth, & Zetterstrom, 1994; Billing, Eriksson, Larsson, & Zetterstrom, 1980; Cernerud, Eriksson, Jonsson, Steneroth, & Zetterstrom, 1996). Children in the amphetamine-exposed group displayed poorer educational outcomes in mathematics, language, and sports, and experienced less stable home environments (less than 25%

had lived with their biological mother continuously since birth [Cernerud et al., 1996]).

There are numerous harmful effects associated with methamphetamine use by parents, including aggression, insomnia, depression, psychosis, cognitive impairment, and physical health problems (Barr et al., 2006; Nordahl, Salo, & Leamon, 2003; Scott et al., 2007), which in turn directly interfere with family functioning and increase the likelihood of child maltreatment (Hayward, DePanfilis, & Woodruff, 2010; Connell-Carrick, 2007). Prenatal methamphetamine use is associated with increased rates of domestic violence, adoption, foster care placements, and CPS involvement (Good, Solt, Acuna, Rotmensch, & Kim, 2010). After entering the child welfare system, methamphetamine-using parents are more likely than their non-using counterparts to be associated with family reunification difficulties and out-of-home child placements (Lloyd & Akin, 2014).

Other more expansive research indicates that parental substance use and prenatal drug use in general is associated with a higher potential of child maltreatment and CPS involvement (Cunningham & Finlay, 2013; Jaudes & Ekwo, 1995; Leventhal et al., 1997; Staton-Tindall, Sprang, Clark, Walker, & Craig, 2013; Williams-Peterson et al., 1994). Indeed, parental substance use has been documented in as many as 80% of child welfare-involved families (Young, Boles, & Otero, 2007). These families, once involved in the child welfare system, are at an increased risk of having their maltreatment allegations substantiated, being re-referred to CPS, and having a child placed in out-of-home care (Brook & McDonald, 2009; Maluccio & Ainsworth, 2003; Staton-Tindall et al., 2013). Compounding this, child welfare-involved families with substance-using parents often do not access, engage in, and complete treatment (Gregoire & Schultz, 2001; Staudt & Cherry, 2009). A major barrier to treatment for these families is poor collaboration between substance abuse treatment providers and child welfare services (Choi & Ryan, 2006). Collaboration is vital to the success of these families, given that child welfare workers, who place priority on ensuring the safety of the child, often lack knowledge about substance abuse and treatment, while substance abuse treatment providers, in focusing on the abuser, are more au fait with addiction treatment than child welfare (Lee, Esaki, & Greene, 2009). The emergent philosophy of Recovery Oriented Systems of Care (ROSC) has recently gained increased attention as being a promising practice for improving inter-agency collaboration and for meeting the needs of, and improving access to treatment for, child welfare-involved individuals with substance use issues (Choi & Ryan, 2006; Ryan, Marsh, Testa, & Louderman, 2006).

## **Recovery Oriented Systems of Care**

Recovery Oriented Systems of Care (ROSC) are networks of person-centered, strength-based recovery services and supports that target substance use issues (SAMHSA, 2010). ROSC address all aspects of substance use problems, from prevention to post-treatment, and may include a wide-range of services such as education, faith-based supports, and medical treatment (SAMHSA, 2010). Family, client, and community involvement are essential elements of ROSC, allowing individuals in recovery to share their experiences in an effort to help and support other individuals in their own recovery (Halvorson, Skinner, & Whitter, 2009). Peer recovery coaches, who are individuals in recovery themselves, are frequently used as part of ROSC (Flaherty, 2009). Peer recovery coaches provide, through a one-on-one relationship, support, encouragement, and motivation to substance-using individuals (SAMHSA, 2009b). Peer recovery support services are strength-based approaches that attempt to uncover and build on an individual's strengths and resiliencies (SAMHSA, 2009b). Rather than focusing on deficits and problems, strength-based approaches draw upon an individual's competencies, values, hopes, and assets to empower and motivate individuals to take the lead in initiating, and sustaining, lifestyle changes (Saleebey, 1996). Peer support services, in being strength-based, utilize a culturally responsive holistic approach that offers individualized recovery plans (Kaplan, 2008). The use of peer support services is receiving increased recognition as a potential means of overcoming barriers associated with disengagement and attrition – both of which predict unsuccessful treatment outcomes (McKay & Weiss, 2001; Smith, 2003). The use of peer recovery coaches to promote treatment engagement and retention is especially relevant for parents involved in the child welfare system, who have markedly low treatment completion rates (Gregoire & Schultz, 2001).

Despite the growing use of peer recovery services, there is limited empirical research on the effectiveness of peer recovery coaches, or the elements of peer delivered services that distinguish them from professional provider delivered services. Two studies conducted among a sample of substance abusing caregivers in the Illinois child welfare system provide promising and provocative findings on the use of peer recovery coaches (Ryan, Choi, Hong, Hernandez, & Larrison, 2008; Ryan et al., 2006).

In their first study, Ryan et al. (2006) examined access to substance abuse services and family reunification among 738 families in Cook County, Illinois, who were involved in foster care cases and who had

substance-using parents. Families were randomly assigned to receive standard treatment (control group) or standard treatment plus a recovery coach (experimental group). Families receiving recovery coaches were significantly more likely than those who received standard treatment to achieve family reunification, to use substance abuse services, and to obtain substance abuse services more expeditiously.

In a more recent study, Ryan et al. (2008), in examining 931 substance-abusing women in Cook County, Illinois who were involved in foster care cases, focused on new substantiated allegations involving substance exposure at birth. Mothers were randomly assigned to receive standard treatment (control group) or standard treatment plus a recovery coach (experimental group). Mothers who received a recovery coach were significantly less likely than those who received standard treatment to be associated with a subsequent substance exposed infant.

Although these studies provide preliminary support for the facilitative effects of peer recovery coaches, limited external validity (due to sample composition) raises the question of whether these findings can be generalized to other populations. Indeed, inclusion criteria set out by both studies were limited to families involved in foster care cases in Cook County, Illinois, and more than 80% of the samples were African American. Moreover, neither study examined the impact of recovery coaches on treatment retention and treatment completion. The purpose of this study was to extend the work of Ryan and colleagues by replicating their survey, in part, among a non-random sample of methamphetamine-abusing parents in a large, southwestern metropolitan community.

## **Study Objectives**

In this study, we evaluated differential rates of case processing and case flow at four critical points in the treatment process: outreach, assessment, treatment initiation, and treatment completion. Guided by Ryan et al.'s work, we hypothesized that the provision of a peer recovery coach would improve rates of, and duration to, outreach, assessment, and treatment initiation, and this in turn would result in higher treatment completion rates.

## **Method**

### **Study Sample**

The study sample consisted of parents or caregivers who were referred by child protective services (CPS) to a specialized substance abuse outpatient treatment program. This non-probability sample of parents or caregivers comprised 6,820 families who were referred to the

routine version of this treatment program (Families FIRST), and an additional 681 families who were referred to an enhanced version of this program. The median age across both groups was 29.28 years. The majority of participants were non-Hispanic White, and female.

## Procedures

***Program description.*** The child welfare substance abuse treatment program, established as the Arizona Families FIRST program, provides outpatient and limited residential substance abuse treatment and related supportive services to parents of children under the investigation and/or custody of CPS. CPS workers refer parents or caregivers to this program when substance use is determined to be either a contributing factor to the alleged child maltreatment or an impediment to family reunification. These specialized substance abuse treatment services are provided through a network of nine community based treatment agencies throughout the state and with defined geographic catchment areas. This study is based upon data obtained from one of these providers. A federally funded (SAMHSA) enhancement to the pre-existing child welfare parent substance abuse treatment program was initiated in 2008 and operated until SAMHSA funding was terminated in 2010.

This enhancement to the existing substance abuse program consisted of three distinguishing elements. First, the enhanced program used trained peer recovery specialists, defined as parents in recovery from substance abuse who had achieved reunification and permanency following CPS maltreatment allegations. These peer recovery coaches provided outreach and engagement to parents recently referred to the program, and served as ‘navigators’ as the referred parents initiated treatment for substance use disorders. These peer recovery coaches were assigned to a client for approximately 60 days and generally discontinued contact with clients after they had successfully engaged in substance abuse treatment (attending at least 4 treatment sessions). Second, the enhanced program prioritized service eligibility to parents with histories of methamphetamine as their primary substance of use. Third, prioritization was given to families with CPS maltreatment allegations involving substance exposed newborns (SEN).

Only one of the nine community based treatment agencies delivered the SAMHSA-funded service enhancements, and the data used for this study are restricted to those clients served by this single agency. This community based treatment agency provided both standard substance abuse treatment services, along with the enhanced program of services. No other enhancements or modifications to the existing array of

substance abuse counseling and supportive services typically provided under the auspices of the statewide program were implemented in the enhanced program. As such, comparative analyses of the processes and outcomes of these two groups of parent-clients (those served through the standard and those served through the enhanced program) provide an opportunity to evaluate the facilitative effects of peer recovery specialists on initiation, retention, and successful completion of substance abuse treatment services.

**Data Sources & Measures.** The data used in this study came from administrative datasets maintained by the treatment agency and the state department of child welfare services. Information from the treatment agency included client descriptives (e.g. gender, education level, and employment status), self-reported substance use patterns, and treatment status/outcomes for clients during a 36-month consecutive period (10/1/2007-9/30/2010). Using identifying information provided by the treatment agency, matching algorithms were applied to the state child welfare system, resulting in matched corresponding data sets related to maltreatment reports and foster care placements among the members of the family units represented by the referred clients. Given that this study used secondary data, individual informed consent was not obtained; however, individuals provided consent to release substance abuse assessment and treatment information, and the study was approved by the Institutional Review Board at Arizona State University.

## **Design**

Individuals were non-randomly referred by their CPS case worker or other CPS staff to the standard or enhanced treatment program if their maltreatment allegations were determined to be associated with parental use of substances. Some clients who were originally referred by their CPS worker to the standard program were re-assigned to the enhanced program if they self-reported use of methamphetamine and/or if substance exposed newborns were documented. Because participants were not randomly assigned, we used propensity score matching (PSM) to reduce selection bias. That is, PSM was used to identify a subgroup of individuals in the standard program that most closely approximated the characteristics observed among those referred to the enhanced program. For a discussion about the utility of PSM, see Guo, Barth, and Gibbons (2006). With PSM, we were able to compare treatment initiation and completion rates among the participants of the standard and enhanced treatment programs.



**Analysis Plan.** Observed differences between the clients referred to the standard and the enhanced programs were adjusted between groups using propensity score matching. Propensity scores, which can be computed with logistic regression, are the predicted probability of group membership based on observed predictors. The first objective was to identify or select observed predictors that could be used to create the propensity scores, which in turn were used to identify a matched comparison sample of families referred to the standard program that most closely approximated the sample of families referred to the enhanced program on the set of observed predictors.

For matching purposes, variables were included if they were associated with the target population of the enhanced program, including the presence of a substance exposed newborn and parental self-reported use of methamphetamine. Dates of client referrals were incorporated into the matching process to control for potential history and/or temporal effects. Other variables were included in the matching process if they were identified from the research literature to be associated with either maltreatment recurrence or engagement in substance abuse treatment. Moreover, binary indicators of complete (versus incomplete) data for substance use, income, education, marital status, CPS report, and index child age were included in the matching process.

**Covariates.** Propensity scores were created using the variables identified in Appendix A due to their availability within the administrative clinical records and as they had been identified in previous research to relate to maltreatment recurrence or engagement in substance abuse treatment. Two dummy year variables (2009 and 2010) and one binary variable for semi-annual periods were included to match samples across time periods. Additionally, six binary variables were included, reflecting complete vs. incomplete data for the following indicators: substance use, income, education, marital status, CPS report, and index child age.

Among those referred to the standard program, 681 (10% of the total sample of clients served in the standard program during the study period) were matched to the sample of clients referred to the enhanced program on the aforementioned variables. Between-group comparisons of the enhanced treatment sample and the matched standard treatment sample were conducted to detect differences between the samples with regard to a series of process indicators and outcomes. Process indicators included differential rates of clients experiencing the following events: outreach, assessment, treatment initiation, and the relative duration (in days) between these events and the date clients were referred to the

programs. Outcome indicators included reasons for treatment termination (successful vs. unsuccessful) and treatment duration (number of days between first and last treatment contact).

## **Results**

### **Sample Characteristics**

Appendix B presents sample descriptive statistics after matching. The frequency or measures of central tendency (mean or medians) for the incorporated variables were the same across the enhanced program and matched comparison standard program samples (see Appendix B). Across both samples, the majority were female (75.5%), White (81.3%) and single (73.5%). The mean age was 28.6 years. About 55% had less than a high school education and 15% were employed. Methamphetamine abuse was self-reported in approximately 67% of these cases. Approximately 71% were documented as substance exposed newborn (SEN) cases and 66% of the cases had an index child one day old.

The only statistical difference that was found was the mean age of the index children. Although the median children's age was the same across the two samples, we incorporated children's age as a control (covariate) when examining group differences in outreach, assessment and services initiation, length of treatment, and treatment termination.

### **Outreach**

The relative rates of outreach (i.e. contact attempts by the treatment agency to initiate the treatment process) were comparable between clients referred to the enhanced program and individuals referred to the standard program. Specifically, there was a contact attempt for approximately 83 percent of clients in each group. Among individuals who had a contact attempt, the enhanced group experienced significantly fewer outreach attempts ( $M = 1.90$ ) than those in the standard treatment group ( $M = 2.22$ ) while experiencing outreach contact significantly more rapidly ( $M = 1.69$  days following referral) than their counterparts referred to the standard treatment program ( $M = 4.86$  days following referral).

### **Assessment and Services Initiation**

Most individuals referred to either program were assessed by the treatment agency (see Table 1 on the next page). Individuals referred to the enhanced program were assessed significantly quicker (approximately 4 days) than their standard program referral counterparts. Nearly all individuals (96.92%) referred to the enhanced program initiated some form of service, which is significantly higher than the rate of service initiation

observed among the standard program referrals (89.87%). Using a more restrictive definition of service initiation, limited to initiation of individual, group, or family counseling, revealed that 84.88% and 82.53% of individuals referred to the enhanced and standard program, respectively, initiated these services. While the rates of counseling service initiation were comparable across samples, those individuals served in the enhanced program began these counseling services significantly more rapidly ( $M = 24.91$  days) than individuals served in the standard program ( $M = 27.76$  days).

### Treatment Termination

Patterns of program completion are presented in Table 2 on the next page. A significantly greater proportion of clients in the standard program were reported to have completed their treatment program (standard group = 38.12%, enhanced group = 26.64%); conversely, a significantly higher rate of clients in the enhanced program was closed for all other reasons (standard group = 8.24%, enhanced group = 15.05%). Interestingly, the relative rates of program drop-out or discontinuation were comparable between groups.

Table 1  
*Patterns of Assessment and Services Initiation*

Service Events	Standard Treatment Group ( $n = 681$ )		Enhanced Treatment Group ( $n = 681$ )	
	#	%	#	%
Assessment	554	81.35	575	84.43
Service Initiation <sup>a*</sup>	612	89.87	660	96.92
Counseling Initiation <sup>b</sup>	562	82.53	578	84.88
	<i>M (SD)</i>	<i>Mdn</i>	<i>M (SD)</i>	<i>Mdn</i>
Days from Referral to Assessment <sup>*</sup>	27.71 (25.19)	21	23.59 (25.03)	17
Days from Referral to First Service <sup>a*</sup>	26.41 (25.84)	20	22.63 (28.54)	15.5
Days from Referral to First Unit of Counseling <sup>b*</sup>	27.76 (26.93)	21	24.91 (29.59)	17

<sup>a</sup>Assessment and drug testing services were not considered services.

<sup>b</sup>All forms of counseling (individual, group, or family) were included.

\* $p < .01$ .

Table 2  
*Patterns of Program Completion*

	Standard Treatment Group ( <i>n</i> = 522)		Enhanced Treatment Group ( <i>n</i> = 578)	
	#	%	#	%
Completed Treatment Plan <sup>*</sup>	199	38.12	154	26.64
Discontinued Participation	276	52.87	329	56.92
Refused Services	4	.77	8	1.38
Other Reasons for Closure <sup>*</sup>	43	8.24	87	15.05

Note: participants were included in this table if they had a record of service encounter (excluding assessment and drug testing services) and a record of case closure.

<sup>\*</sup>*p* < .01.

### Length of Treatment

Patterns of length of treatment are displayed in Table 3 on the next page. Among all closed referrals, the average length of treatment was significantly greater for clients in the enhanced program (*M* = 153.51 days) than for clients in the standard program (*M* = 126.37 days). Among those who completed their treatment program, the average length of treatment was significantly greater for clients in the enhanced program (*M* = 182.93 days) than for clients in the standard program (*M* = 140.67 days). Clients in the enhanced program who discontinued participation remained in treatment for a statistically greater length of time (*M* = 157.85 days) than clients in the standard program who discontinued participation (*M* = 120.38).

Table 3  
*Patterns of Length of Treatment*

		Standard Treatment Group	Enhanced Treatment Group
All Closed Referrals*	<i>n</i>	494	570
	<i>M</i>	126.37	153.51
	<i>SD</i>	92.81	125.07
	<i>Mdn</i>	105.5	120
Completed Treatment Plan*	<i>n</i>	187	152
	<i>M</i>	140.67	182.93
	<i>SD</i>	104.61	141.6
	<i>Mdn</i>	118	151
Discontinued Participation*	<i>n</i>	268	329
	<i>M</i>	120.38	157.85
	<i>SD</i>	84.03	119.98
	<i>Mdn</i>	104	123
Refused Services	<i>n</i>	4	8
	<i>M</i>	195.75	227.75
	<i>SD</i>	67.75	119.68
	<i>Mdn</i>	200.5	187.5
Other Reasons for Closure	<i>n</i>	30	78
	<i>M</i>	82.63	70.42
	<i>SD</i>	73.89	64.95
	<i>Mdn</i>	55	51

*Note.* Descriptive statistics were not calculated when the first and last service dates were the same; length of treatment was calculated even when a closure reason was missing; closure reasons were missing for 5 records in the standard program group and 3 records in the enhanced program group.

\*  $p < .01$

## Discussion

This study found the provision of a peer recovery coach reduced the duration of time from referral to successful outreach and clinical assessment. The rate of, and duration to, service initiation also significantly improved with the use of a peer recovery coach. These observations are supported by Ryan et al.'s (2006) research, which found peer recovery coaches to be effective in increasing access to treatment services and reducing time to service initiation for substance abusing caregivers in the Illinois child welfare system. However, our study found an overall higher rate of service initiation for both the enhanced program

(97%) and standard program (90%) compared to those reported by Ryan et al. (2006) (84% and 74%, respectively). This inconsistency may be due to inherent sample differences: for example, whereas our sample consisted of methamphetamine using parents and parents with substance exposed newborns who resided in the Southwest, Ryan et al.'s (2006) sample consisted of substance abusing parents in general who resided in the Midwest.

Another finding from this study indicates that clients who were assigned a peer recovery coach remained in treatment for a longer period of time than clients who were not assigned a peer recovery coach. Despite this, clients with peer recovery coaches did not have higher treatment completion rates than those without peer recovery coaches. These findings are somewhat paradoxical, in that one would expect longer periods of treatment to be associated with higher rates of treatment completion. Another unexpected finding was that clients who had a peer recovery coach took longer than those without peer recovery coaches to complete their treatment plan. The percent of 'other reasons for closure' was significantly higher for clients in the enhanced program (15%) than for the matched comparison clients in the standard program (8%). Since these other reasons are unknown, further investigation is warranted. These findings suggest that peer recovery coaches increase treatment initiation and length of treatment, but these increases are not indicative of greater treatment completion rates.

This study is the first to examine the effectiveness of peer recovery coaches in promoting treatment retention and completion among substance using parents who are involved in the child welfare system. Despite this unique contribution, this study is not without limitations. Ideally, randomly assigning individuals into the enhanced or standard group would have assisted in reducing the likelihood of spurious relationships. Since participants were not randomized, we attempted to overcome biases by using propensity score matching to identify a subgroup of referrals to the standard program that most closely approximated the characteristics observed among those referred to the enhanced program. Given that we did not have data on all of the potential variables, it is also possible that there may have been other confounding variables that we did not match on.

Another limitation is that the study samples were from one specific provider, and were not random samples from all potential clients. Therefore the findings may not be representative of other agencies and may not be generalized to all methamphetamine-using parents or parents of substance exposed newborns. Furthermore, the majority of analyses

were conducted based on administrative data sets that contained missing data. For example, we were able to identify CPS reports for 70% of all referrals, despite our efforts to locate all missing reports. Restricting our analyses to available data may potentially result in an inability to make accurate inferences to the population.

Lastly, fidelity of the peer recovery services was not assessed; as such, it is uncertain if all individuals in the enhanced group received similar peer recovery services. Given that some aspects of peer recovery services may be more beneficial than others, further investigation is warranted. Despite these limitations, findings from this study nonetheless have important implications for the use of peer recovery coaches for CPS involved families with substance exposed newborns and methamphetamine using parents.

Given the paucity of research on the effectiveness of peer recovery coaches for substance abusing caregivers in the child welfare system, large randomized controlled trials are greatly needed. While this study is one step in filling the gap, more research is also needed before definitive conclusions can be made about the effectiveness of peer recovery coaches in increasing rates of treatment initiation, retention, and completion. Nonetheless, there appears to be some benefit of utilizing peer recovery coaches in the studied sample (i.e. child welfare-involved parents of substance exposed newborns and methamphetamine using parents), especially with regard to treatment initiation and retention.

Future research should also examine whether the dosage of peer recovery coaches is related to program completion. Specifically, it may prove worthwhile to examine whether duration predicts treatment completion rates: Is it possible that individuals are more likely to complete their treatment plan if they interact with a peer recovery coach for longer durations? In a similar vein, future studies should explore the effect of peer recovery coaches on treatment completion rates if they are assigned for the entire duration of treatment, and not just 60 days.

## Appendix A

*Available Variables in Administrative Datasets Associated with either Engagement in Substance Abuse Treatment or Maltreatment Recurrence that Were Used to Compute Propensity Scores*

Variables	Substance Abuse Treatment Engagement	Maltreatment Recurrence
Caucasian/White	SAMHSA (2009c)	Fuller & Wells (2003)
Pending Criminal Charges	Brecht et al, 2005	Fuller & Wells (2003)
Substance Use:	Messer et al (1996); Brecht et al (2005)	English et al (1999) <sup>a</sup> ; Fuller & Wells (2003)
Alcohol Use & Primary Alcohol Use	Messer et al (1996); SAMHSA, (2009c)	
Marijuana Use	Messer et al (1996)	
Methamphetamine Use	Brecht et al (2005)	
Cocaine/Crack Use or Cocaine/Crack as Primary Drug	Brecht et al (2005); King & Canada (2004); Messer et al (1996)	
Heroin and Opioids	Brecht et al (2005)	
Gender (Female)	King & Canada (2004)	
Black/African-American	Brecht et al (2005); Messer et al (1996);	
Hispanic/Latino	Brecht et al (2005)	
Educational Level (Dummy Coded)	King & Canada (2004); Brecht et al (2005); Messer et al (1996)	
Employment Status (Full or Part-time)	SAMHSA (2009c)	
Clients Age (Dummy Coded)	SAMHSA (2009c)	
More than One Child in CPS Maltreatment Report	Messer et al (1996)	Wood (1997) <sup>a</sup>
Has Income		Rittner (2002) <sup>a</sup>
Maltreatment Record of SEN Index Child \Age (Dummy Coded)		Smith & Testa (2002)
		English et al (1999) <sup>a</sup> ; Fryer and Miyoshi (1994) <sup>a</sup> ;
		Herrenkohl et al (1979) <sup>a</sup> ;
		Littell et al (2002) <sup>a</sup>
Single Marital Status (Single and Never Married)		Fuller & Wells (2003)
Interaction between Single Marital Status and African American		Fuller & Wells (2003)
Domestic Violence		DePanfilis & Zuravin (1999) <sup>a</sup> ;
		English et al (1999) <sup>a</sup>
Out-of-Home Placement for any Children within a Maltreatment Report		DePanfilis & Zuravin (1999) <sup>a</sup>
		Smith & Testa (2002)

<sup>a</sup> Based on a published systematic literature review containing 16 articles (Hindley, Ramchandani, & Jones, 2006)



## Appendix B

### *Sample Characteristics of Propensity Score Matched and Peer-Recovery Coach Groups*

Variables in Administrative Data	Group			
	Propensity Score Matched (Standard Treatment)		Peer-Recovery Coach (Enhanced Treatment)	
	#	%	#	%
Gender (Female)	539	79.15	544	79.88
Caucasian/White	558	81.94	549	80.62
Hispanic/Latino	200	29.37	215	31.57
Black/African-American	61	8.96	61	8.96
Marital Status (Single - Never Married)	349	72.11	368	74.95
Single and African American (Interaction Term)	30	6.20	33	6.72
Clients Age (years)	<i>M</i> = 28.63 <i>Mdn</i> = 27.64	<i>SD</i> = 6.92	<i>M</i> = 28.57 <i>Mdn</i> = 27.36	<i>SD</i> = 6.58
(reference category: 18 to 21.99)	104	15.27	104	15.27
22 to 24.5	108	15.86	113	16.59
24.6 to 26.99	105	15.42	108	15.86
27 to 29.99	126	18.50	116	17.03
30 to 34.99	126	18.50	118	17.33
35 to 38.5	54	7.93	65	9.54
> 38.5	58	8.52	57	8.37
Has Income	59	9.62	63	10.23
Educational Level (reference category: < HS)	292	55.20	300	55.76
HS Grad or GED	113	21.36	125	23.23
> HS	124	23.44	113	21.00
Employed (full or part-time)	83	15.04	89	15.56

## Appendix B Continued

### *Sample Characteristics of Propensity Score Matched and Peer-Recovery Coach Groups*

Variables in Administrative Data	Group			
	Propensity Score Matched (Standard Treatment)		Peer-Recovery Coach (Enhanced Treatment)	
	#	%	#	%
Alcohol or Substance Use				
Used Alcohol	301	56.16	297	54.00
Methamphetamine Use	360	67.16	367	66.73
Marijuana	262	48.88	266	48.36
Used Cocaine/Crack	88	16.42	94	17.09
Heroin/Opioids	29	5.41	28	5.09
Alcohol or Cocaine Primary Use				
Primary Alcohol Use	52	9.70	50	9.09
Cocaine/Crack as Primary Drug	29	5.41	35	6.36
Pending Criminal Charges	512	75.18	513	75.33
Domestic Violence	109	17.78	104	16.88
Tracking Characteristic of SEN	391	69.82	416	72.85
Index Child \Age (reference category: 1 day)	314	67.38	293	65.40
> 1 day and < 1 month	66	14.16	65	14.51
1 month to 2 Years	38	8.15	46	10.27
> 2 years	48	10.30	44	9.82
More than One Child in Maltreatment Report	84	17.46	83	17.81
Out-of-Home Placement for any Children within a Maltreatment Report	170	35.34	182	39.06

Missing cases: domestic violence and income ( $n_{\text{matched}} = 68$ ;  $n_{\text{coach}} = 65$ ); SEN ( $n_{\text{matched}} = 121$ ;  $n_{\text{coach}} = 110$ ); employment ( $n_{\text{matched}} = 129$ ;  $n_{\text{coach}} = 109$ ); alcohol, substance/cocaine use ( $n_{\text{matched}} = 145$ ;  $n_{\text{coach}} = 131$ ); education ( $n_{\text{matched}} = 152$ ;  $n_{\text{coach}} = 143$ ); marital status ( $n_{\text{matched}} = 197$ ;  $n_{\text{coach}} = 190$ ); maltreatment report or placement ( $n_{\text{matched}} = 200$ ;  $n_{\text{coach}} = 215$ ); child's age ( $n_{\text{matched}} = 215$ ;  $n_{\text{coach}} = 233$ ).

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